

Title: Awesome Area- Geometry and Measurement

Brief Overview:

The students will use prior knowledge and manipulatives to explore the concept of area. They will investigate the area of different sized figures.

NCTM Content Standard/National Science Education Standard:

Number and Operations

- Compute fluently and make reasonable estimates

Geometry

- Build and draw geometric objects.

Measurement

- Understand measurable attributes of objects and the units, systems, and processes of measurement.
- Apply appropriate techniques, tools, and formulas to determine measurements.
- Develop strategies to determine the areas of polygons.
- Develop strategies for estimating the areas of irregular shapes.
- Explore what happens to measurements of a two dimensional shape such as its perimeter and area when the shape is changed in some way.

Grade/Level:

Second/Third Grade

Duration/Length:

Four days (60 minutes each day)

Student Outcomes:

Students will:

- Develop the concept of area by utilizing color tiles to count the interior of polygons.
- Create various figures having an area of 24 square units with snap cubes.
- Explore what happens on a geoboard to the measurements of shapes when the perimeter stays the same.

Materials and Resources:

- color tiles
- baskets for each cooperative team
- color tile paper- inch grid paper
- snap cubes
- $\frac{3}{4}$ inch grid paper
- geoboards
- geoboard paper
- colored pencils or crayons
- number cubes-green and yellow
- calculator

- masking tape
- math journal

Development/Procedures:

Lesson 1

Preassessment – Use the “Area” worksheet, Student Resource Sheet 1, to preassess what students already know about area. Encourage students to discuss what they think area is, what it looks like on a drawing, and to ask one question about area.

Launch – Have students participate in a classroom walk and select items to measure with nonstandard units to find the area. Demonstrate how to use nonstandard units of measurement such as large paper clips to find the area of his/her desk. Measurements will be recorded on the overhead, added and then checked utilizing the calculator. Section off a portion of the classroom floor in whole tiles to be measured. Each cooperative team will be given two minutes to count the floor tiles in the allotted space and record in math journals. After each cooperative team has recorded results, they will share with the teacher.

Teacher Facilitation – Each cooperative team will be given a basket with one-inch color tiles. Students will each receive a copy of the Color Tile Data Activity Sheet, Student Resource Sheet 2. Using the two Color Tile Activity worksheets, Student Resources Sheets 3 and 4, have students find the area utilizing color tiles. Demonstrate how to cover the first polygon with color tiles, estimate the area and then count the area of each shape. Encourage students to use the data activity sheet to record estimations. Answers may be found on Teacher Resource Sheet 1.

Student Application – Students will continue to use color tiles to cover the remaining polygons on Student Resource Sheets 3 and 4. Use data collection table to record estimations and actual area of each shape.

Embedded Assessment – Use teacher observation sheet, Teacher Resource Sheet 2, to record each student’s ability to:

- estimate area of polygons
- find the actual area of polygons using color tiles
- count by whole numbers

Reteaching/Extension – Distribute “Roll to Build an Awesome Area Activity Sheet,” Student Resource Sheet 5, to students. Students will work with a partner to play the “Roll an Awesome Area” game. Each cooperative pair will be given a green and yellow number cube. The green number cube will represent the number of rows in the figure. The yellow number cube will represent the number of tiles in a row. After each roll, students must record their numbers on the activity sheet, construct and draw the color tile array.

Lesson 2

Preassessment-Distribute basket of snap cubes to each cooperative team. Direct students to grab a handful of snap cubes in order to create a closed figure. They will exchange the newly created polygon with the person to his/her left and record the area in a math journal. Shapes will continue to be passed to the left in the team until all created figures have been recorded.

Launch-Have students each select 16 snap cubes and make a rectangular shape without holes that has an area of 16 square units.

Teacher Facilitation-Teacher will direct students to select 24 snap cubes in order to create shapes with an area of 24 square units. Model an example for the students on the overhead projector. Hand out $\frac{3}{4}$ inch grid paper, Student Resource Sheet 6. Afterwards, each shape will be traced and shaded on 2 cm grid paper with colored pencils or crayons.

Student Application-Students will work independently to create several figures with an area of 24 square units. They will use colored pencils to trace their created figures on the $\frac{3}{4}$ inch grid paper.

Embedded Assessment- Use a teacher observation sheet, Teacher Resource Sheet 2, to record each student's ability to:

- use snap cubes to create shapes with an area of 24 square units.
- sketch student created polygons on $\frac{3}{4}$ inch grid paper.

Reteaching/Extension-Hand out the Snap Cube Area Activity sheet and the Data Collection sheet, Student Resource Sheets 7 and 8, in order for students to count and record the area of given shapes. Answers may be found on Teacher Resource Sheet 3.

Lesson 3

Preassessment- Distribute geoboards and rubber bands to each child. Students will be asked to create 4 closed shapes with no diagonal lines. After creating a shape, they are to record it on the dot paper that will be used later in the lesson.

Launch –Have students find and draw three geometric shapes found in the classroom in their math journals. They can choose to find the area of these shapes with either color tiles or snap cubes. They will share results with team members. Randomly choose students to share their answers.

Teacher Facilitation –Utilize student created shapes from Student Resource Sheet 9 from the preassessment activity to determine the area of each polygon. Randomly choose student created models and place on the overhead to figure out the area of several polygons. Students will figure out the area of the selected polygon. Then another student created polygon will be used on the overhead to reinforce the skill. Ask a question such as, “Is there a polygon that is larger than 12 square units?” Hand out Geoboard Awesome Area Activity worksheet, Student Resource Sheet 10. As a whole class, calculate the area of the first three shapes from Student Resource Sheet 10. Figure out and label the area of each figure and write it inside of the box.

Student Application –Students will independently complete the nine remaining geoboard squares from Student Resource Sheet 10. They should be reminded to write the area of the nine remaining geoboard squares on the geoboard dot paper. Answers may be found on Teacher Resource Sheet 4.

Embedded Assessment- Use a teacher observation sheet, Teacher Resource Sheet 2, to record each student’s ability to:

- use geoboards and rubber bands to make polygons
- record the area of closed figures
- compare the area of different figures

Reteaching/Extension-Distribute geoboard dot paper and Student Resource Sheet 9 to the students. Direct students to create 12 polygons. Switch the completed papers with a partner. Direct the students to calculate the area of each polygon by counting the number of squares, and write the area within each created polygon.

Summative Assessment: Students will be given an assessment to mirror the Maryland State Assessment. There will be a **Selective Response** section followed by a **Brief Constructed Response**. In the Selective Response section, the students will figure out the area of given geometric shapes and bubble in the correct answer for each shape. The Brief Constructed Response section will have a part A and B. In part A, students will count squares to calculate and label the area of a specified shape. Afterwards in part B, students will explain in their words how they figured out their answer. Answers can be found on Teacher Resource Sheet 5.

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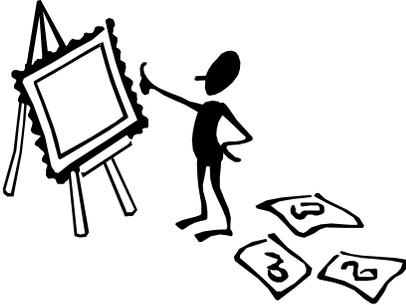
What I KNOW about AREA!

 I think area is...

One question I have about area is...



Here's a picture to show what I know about area:



Color Tile Data Sheet

Name _____

Date _____

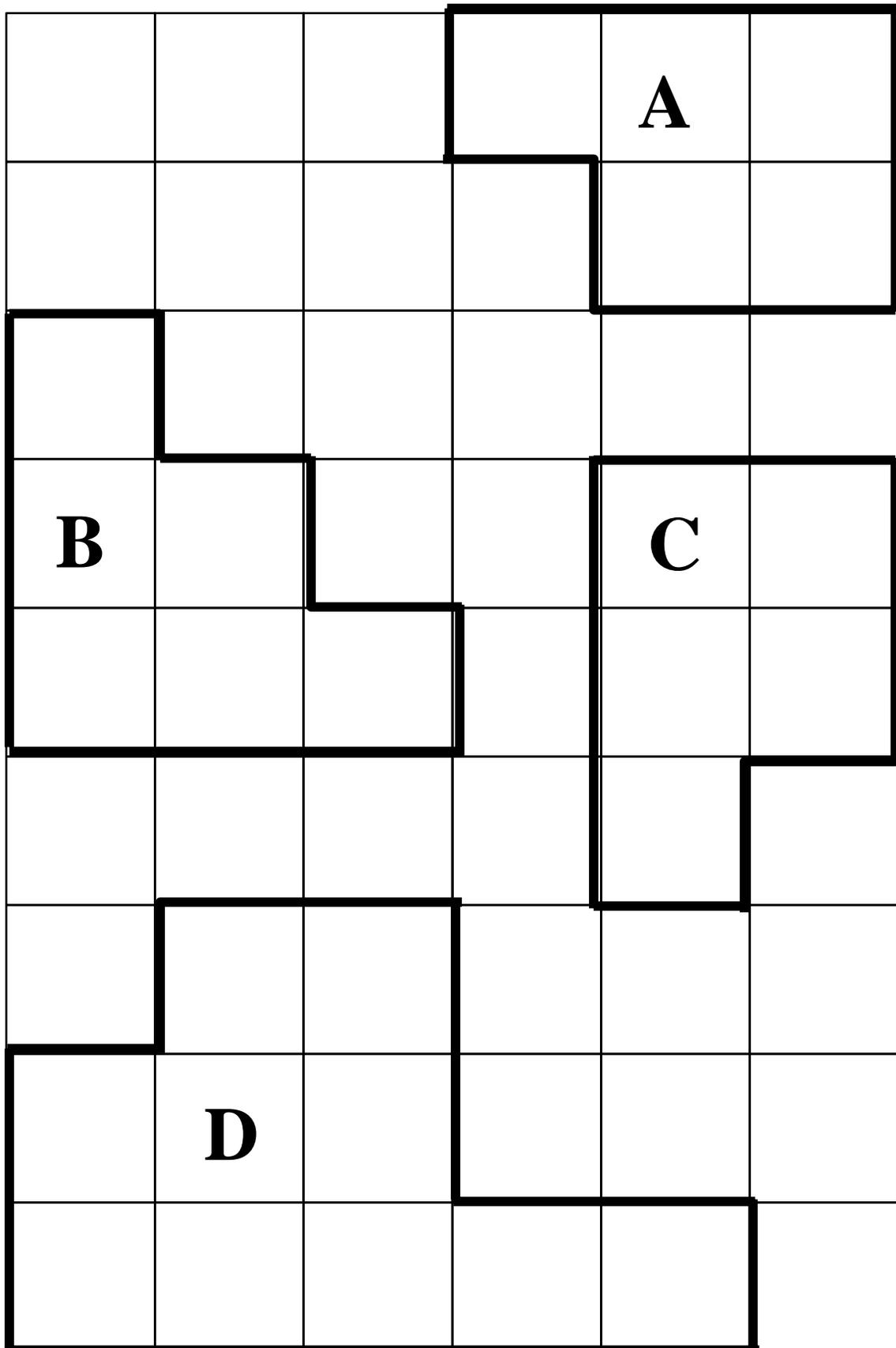
Shape	Estimated Area	Actual Area
A		
B		
C		
D		
E		
F		
G		
H		
I		

Color Tile Data Sheet – Answer Sheet

Name _____

Date _____

Shape	Estimated Area	Actual Area
A		5 square units
B		6 square units
C		5 square units
D		10 square units
E		10 square units
F		5 square units
G		5 square units
H		3 square units
I		3 square units



Teacher Observational Checklist

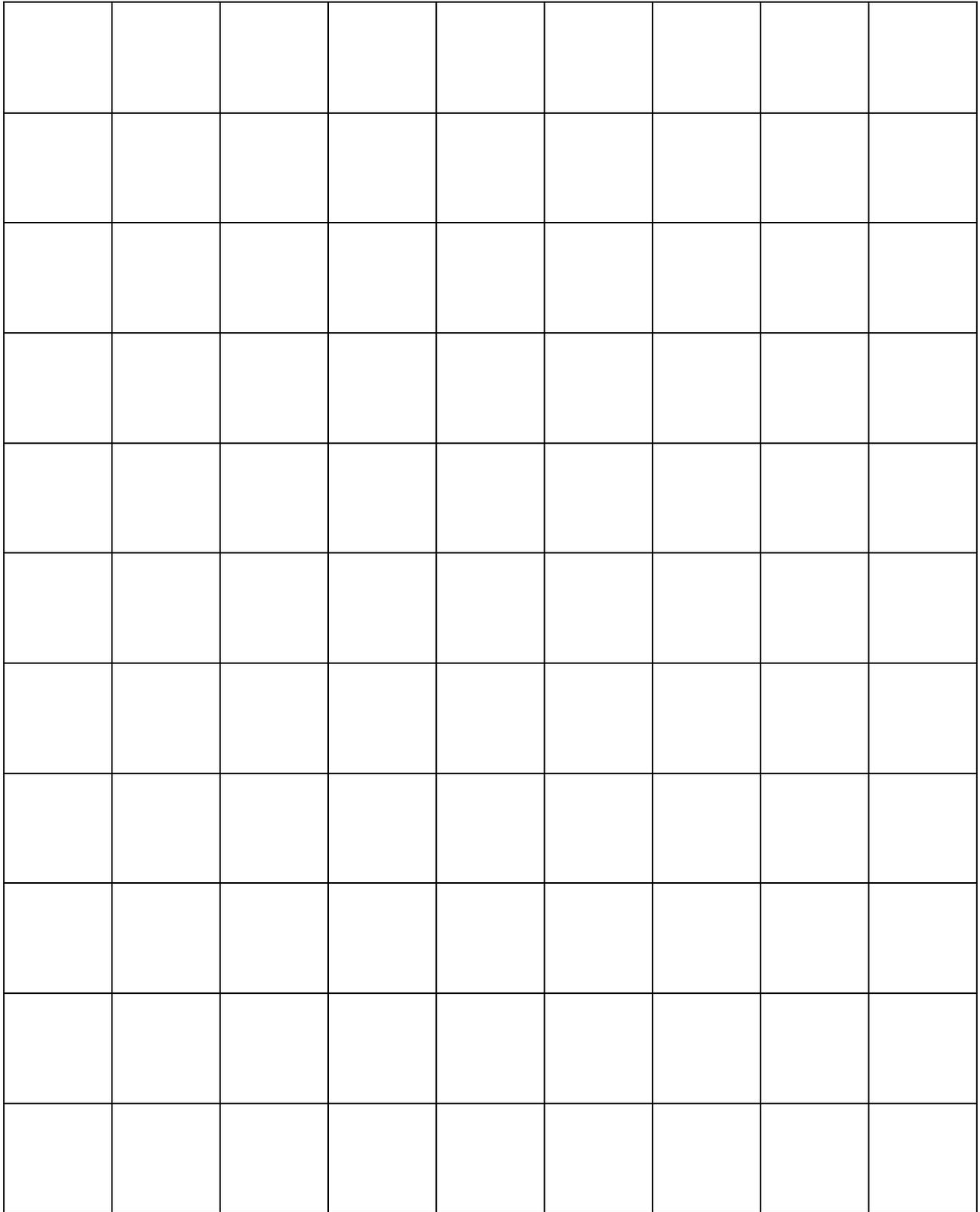
	Outcomes			
Student Names		Lesson 1	Lesson 2	Lesson 3
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				

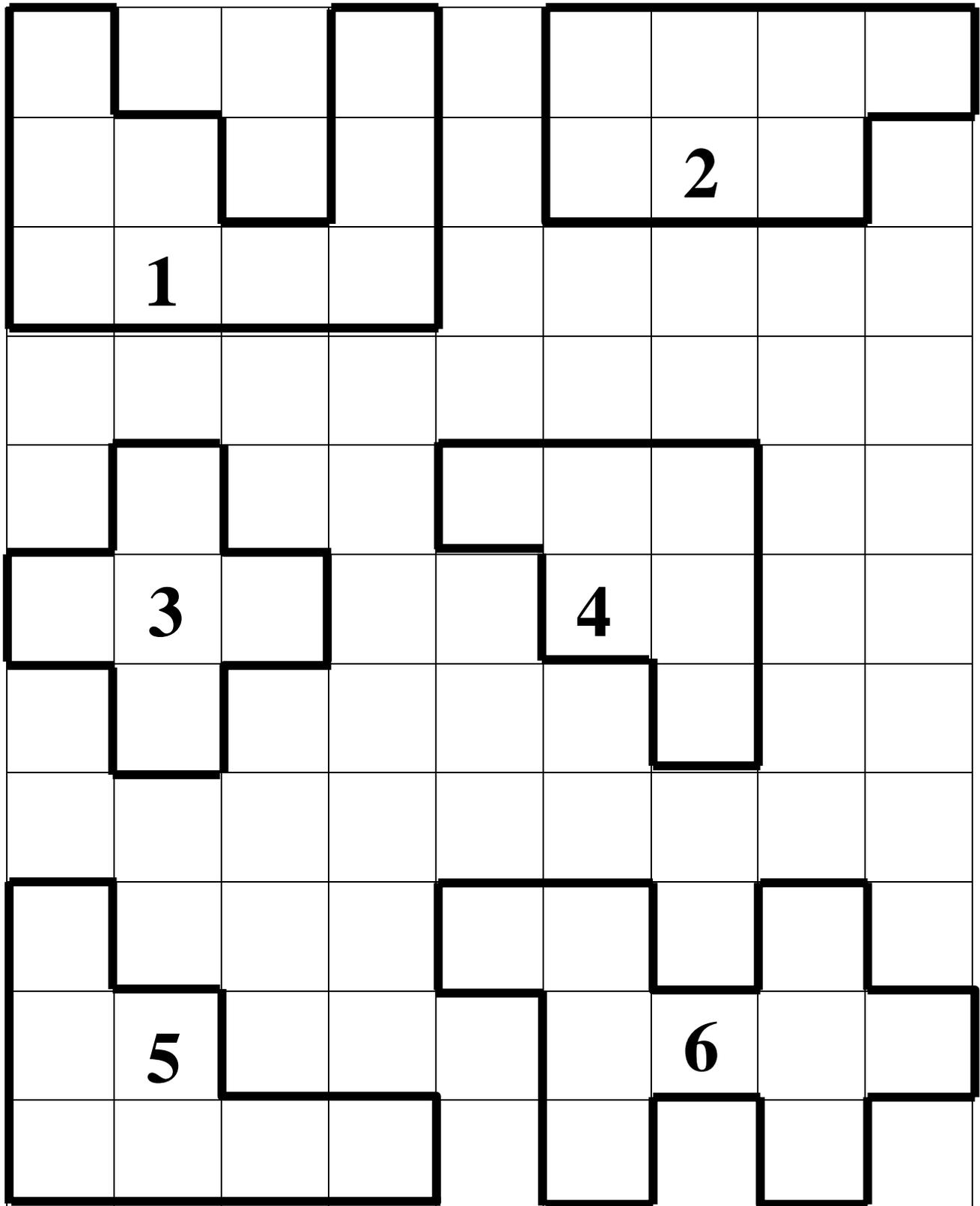
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

“Roll to Build an Awesome Area Sheet”

Roll Number	Green Roll (number of rows)	Yellow Roll (number of tiles in a row)	Area	Diagram of shape
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Three-Quarter Inch Grid Paper





Name

Date

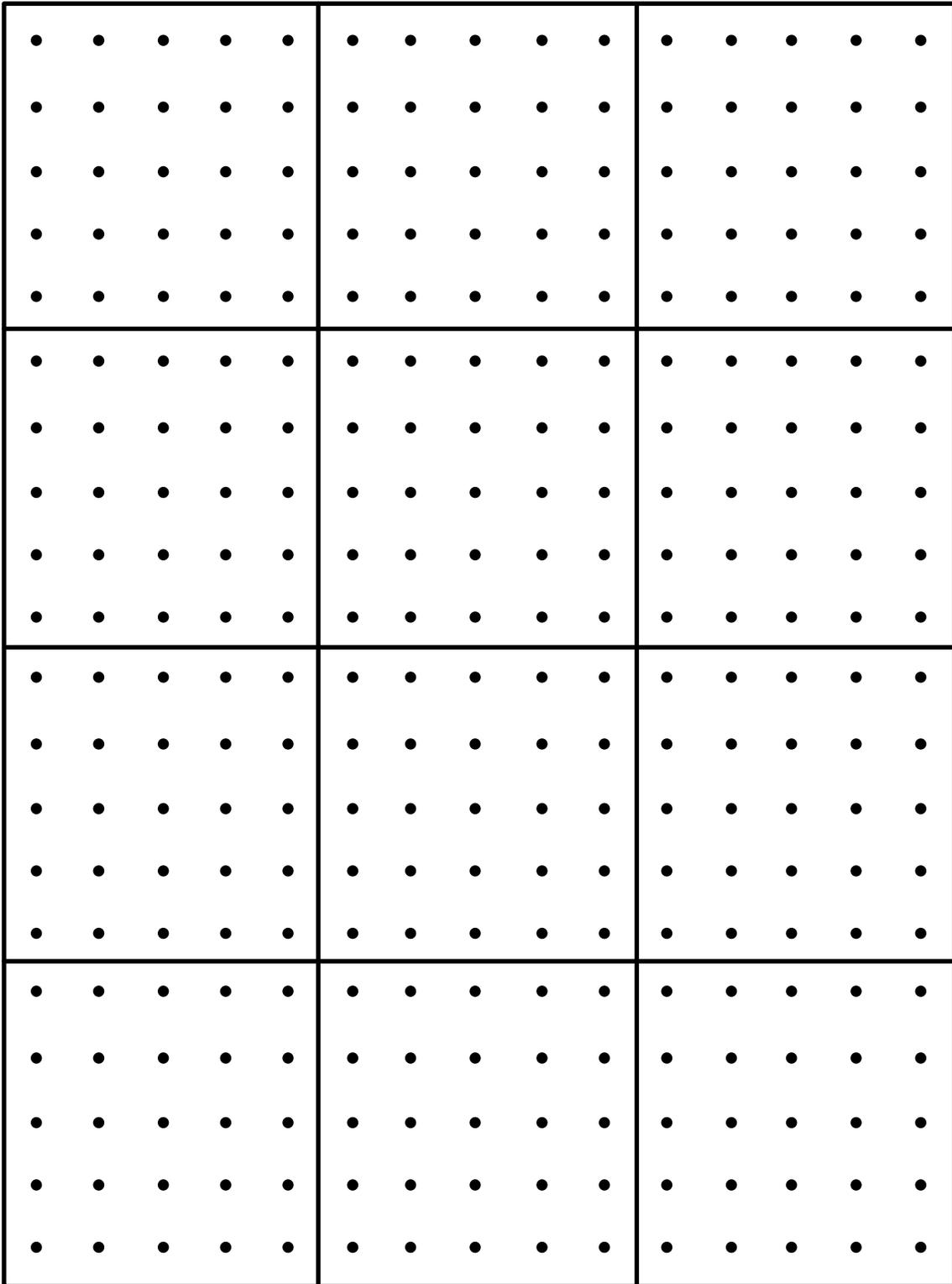
Snap Cube Area Data Collection Sheet

Shape	Actual Area
1.	
2.	
3.	
4.	
5.	
6.	

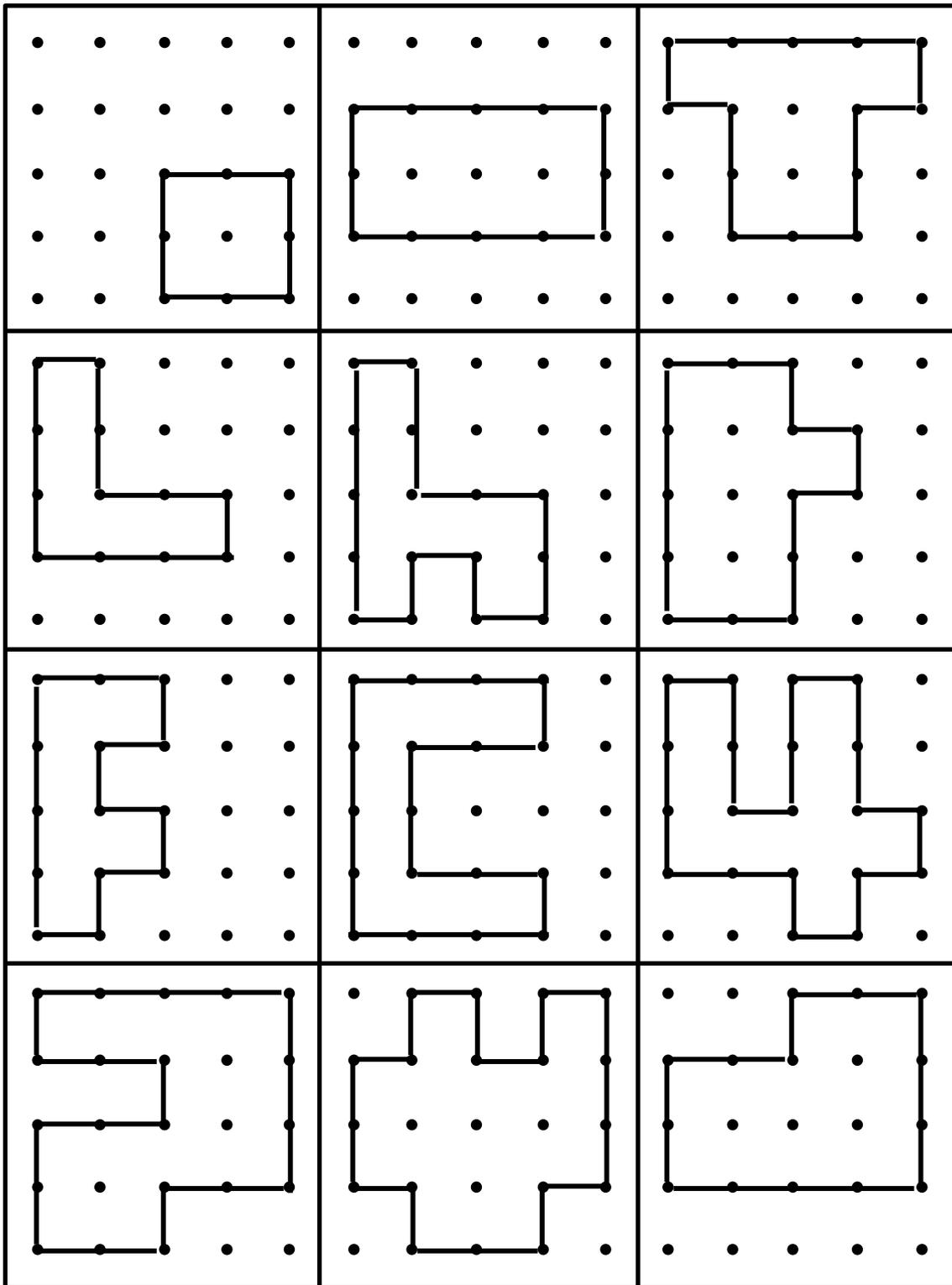
Snap Cube Area Data Collection Sheet**Answer key**

Shape	Actual Area
1.	9 square units
2.	7 square units
3.	5 square units
4.	6 square units
5.	7 square units
6.	9 square units

Geoboard Dot Paper



Geoboard Awesome Area



Geoboard Awesome Area – Answer Sheet

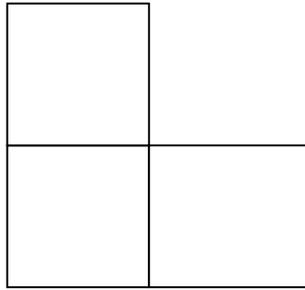
4 square units	8 square units	8 square units
5 square units	7 square units	9 square units
6 square units	8 square units	square units
12 square units	12 square units	10 square units

Name _____ Date _____

Summative Assessment

Directions: Find the area for the following shapes and darken in the correct answer.

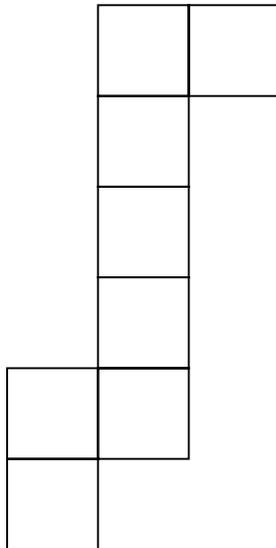
1.



- A. 5 square units
- C. 2 square units

- B. 3 square units
- D. 4 square units

2.



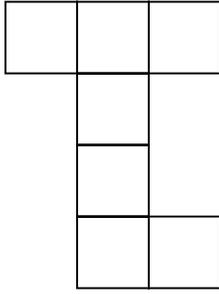
- A. 10 square units
- C. 12 square units

- B. 6 square units
- D. 8 square units

Brief Constructed Response

Part A

What is the area of this shape?



Part B

Use what you know about area to explain how you found your answer. Be sure to use words and/or numbers in your explanation.

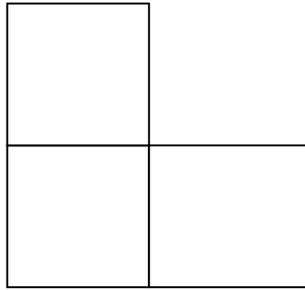
Name Answer Key

Date _____

Summative Assessment

Directions: Find the area for the following shapes and darken in the correct answer.

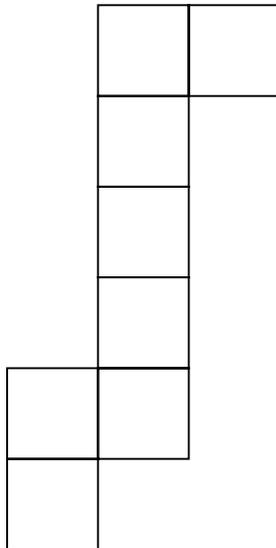
1.



- A. 5 square units
 C. 2 square units

- B. 3 square units
 D. 4 square units

2.



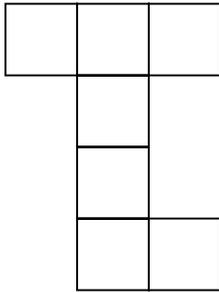
- A. 10 square units
 C. 12 square units

- B. 6 square units
 D. 8 square units

Brief Constructed Response

Part A

What is the area of this shape?



The area is 7 square units.

Part B

Use what you know about area to explain how you found your answer. Be sure to use words and/or numbers in your explanation.

Answers will vary but will include that the number of unit squares were counted and

there are 7 of them.

“Awesome Area”
Brief Constructed Response
Mathematics Rubric
Grades 1-8

Score	
2	<p>My answer shows I completely understood the problem and how to solve it:</p> <ul style="list-style-type: none"> • I used very good, complete strategy to correctly solve the problem. • I used my best math vocabulary to clearly explain what I did to solve the problem. My explanation was complete, well organized and logical. • I applied what I know about math to correctly solve the problem. • I used numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem.
1	<p>My answer show I understood most of the problem and how to solve it:</p> <ul style="list-style-type: none"> • I used a strategy to find a solution that was partly correct. • I used some math vocabulary and most of my reasons were correct to explain how I solved the problem. My explanation needed to me more complete, well organized or logical. • I partly applied what I know about math to solve the problem. • I tried to use numbers, words, symbols or pictures (or a combination of them) to show how I got my answer, but these may not have been completely correct.
0	<p>My answer shows I didn't understand the problem and how to solve it:</p> <ul style="list-style-type: none"> • I wasn't able to use a good strategy to solve the problem. • My strategy wasn't related to what was asked. • I didn't apply what I know about math to solve the problem. • I left my answer blank.

